### **REMARKS**

The above amendments to the specification, claims and abstract have been made to place the application in proper U.S. format and to conform with proper grammatical and idiomatic English. None of the amendments herein are made for reasons related to patentability. No new matter has been added.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned "Version with markings to show changes made".

In the event that the transmittal letter is separated from this document and the Patent Office determines that an extension and/or other relief is required, applicant petitions for any required relief including extensions of time and authorizes the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to <u>Deposit</u> <u>Account No. 03-1952</u> referencing docket no. <u>449122007600</u>. However, the Commissioner is not authorized to charge the cost of the issue fee to the Deposit Account.

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Respectfully submitted,

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#### **VERSION WITH MARKINGS TO SHOW CHANGES MADE**

For the convenience of the Examiner, the changes made are shown below with deleted text in strikethrough and added text in underline.

## In the Title:

On page 1, please replace the title with the following:

#### COMPOSITE OF TWO PARTS, FORMED USING A GLUE

#### In the Specification:

Page 1 before the first paragraph, please delete the following:

**Description** 

Page 1, between lines 4 and 5 has been amended to include the following:

#### **CLAIM FOR PRIORITY**

This application claims priority to International Application No. PCT/DE00/00170 which was published in the German language on August 3, 2000.

### TECHNICAL FIELD OF THE INVENTION

Paragraph beginning on line 4 of page 1 has been amended as follows:

The invention relates to the field of machine elements and is to be used for designing a composite of two parts, and in particular, to composite of which one is a rare-earth permanent magnet and the other is a metallic support.

Page 1, between lines 7 and 8, has been amended to include the following: BACKGROUND OF THE INVENTION

Paragraph beginning on line 8 of page 1 has been amended as follows:

In a known composite of this type (DE 195 38 468 A1), a first part in the form of a cuboid permanent magnet is screwed onto a second part in the form of a cylindrical axle of a magnetic clutch. An epoxy resin-based glue which has a dual curing mechanism is used for this.

- The invention is based on the discovery that such a glue is not, however, suitable for the

permanent bonding of certain large surfaced parts, such as e.g. a rare earth permanent magnet and an iron pole of an electrical machine, because the thermomechanical property level of the epoxy resin glue is not matched in such a way, to the opposed thermal expansion coefficients of the elements to be used, that the elasticity of the bond produced in this way could meet the extreme requirements which exist whenever two glued parts with an opposed thermal expansion coefficient are used in a temperature range of from -30°C to 150°C. Such conditions are encountered, for example, in permanent field synchronous motors for the propulsion systems of ships (Jahrbuch der schiffbautechnischen Gesellschaft [Shipbuilders' yearbook] 81 (1987), pp. 221 to 227). Depending on the size of the glued permanent magnets, and therefore on the size of the joint surface, thermally induced length change differences between the glued parts of up to a few hundred μm can occur; the elasticity of the glued point or bond should permit such length change differences.

Page 2, between lines 5 and 6, has been amended to include the following:

### SUMMARY OF THE INVENTION

In one embodiment of the invention, there is a composite having two parts. The composite being formed using a thermally curable glue that forms a spaced joint which includes for example, a rare-earth permanent magnet having a joint surface of at least 1000 mm² and a metallic support which is a ferromagnetic pole of an electrical machine. The glue includes an addition-crosslinking, single-component and self-adhesive silicone glue, the glue layer having a layer thickness of about 70 to 150 μm and includes spherical spacers in an amount of about 0.5 to about 5% by weight of the glue mass.

In one aspect of the invention, the diameter of the spacers and a thickness of the glue layer is between about 100 and about 125 μm.

#### DETAILED DESCRIPTION OF THE INVENTION

The invention is based on the discovery that a glue, as described in the Background of the Invention, is not suitable for the permanent bonding of certain large-surfaced parts, such as a rare-earth permanent magnet and an iron pole of an electrical machine. This is because the thermomechanical property level of the epoxy resin glue is not matched in such a way, to the opposed thermal expansion coefficients of the elements to be used, that the elasticity of the bond

produced could meet the extreme requirements which exist whenever two glued parts with an opposed thermal expansion coefficient are used in a temperature range of from –30°C to 150°C. Such conditions are encountered, for example, in permanent-field synchronous motors for the propulsion systems of ships (Jahrbuch der schiffbautechnischen Gesellschaft [Shipbuilders' yearbook] 81 (1987), pp. 221 to 227). Depending on the size of the glued permanent magnets, and therefore on the size of the joint surface, thermally induced length-change differences between the glued parts of up to a few hundred μm can occur. The elasticity of the glued point or bond should permit such length-change differences.

Paragraph beginning on line 6 of page 2 has been amended as follows:

It is therefore an object of the <u>The</u> invention to <u>discloses</u> design <u>of</u> a composite, <u>having</u> the features of the preamble of patent claim 1, in such a way as to provide a composite which is stable over a wide temperature range even for parts with an opposed expansion coefficient and a large joint surface.

Paragraph beginning on line 12 of page 2 has been amended as follows:

This object is achieved according to the invention in that, in the case of In one embodiment, a joint surface of the rare-earth permanent magnet of at least 1000 mm<sup>2</sup> and a ferromagnetic pole of an electrical machine as metallic support, the glue eonsists of includes an addition-crosslinking, single-component and self-adhesive silicone glue, the glue layer having a layer thickness of from about 70 to about 150 µm and eontaining includes spherical spacers in an amount of from 0.5 to 5% by weight of the glue mass.

Paragraph beginning on line 22 of page 2 has been amended as follows:

Such a joint is distinguished by a highly elastic bond that is stable over a wide temperature range, with very good adhesion on the two parts. To adjust the spaced joint, spacers in the form of glass and/or ceramic spheres have proved advantageous. The glass and/or ceramic spheres are either incorporated into the silicone glue before it is applied to one of the parts, or is scattered over the pre-applied silicone glue bed while the joint is still open. Spacers having a thickness of between about 100 and about 125 µm are preferably used. The proportion in the

silicone adhesive is preferably from 0.75 to 3, in particular approximately 1% by weight, expressed in terms of the total silicone glue mass.

Paragraph beginning on line 4 of page 3 has been amended as follows:

When producing the composite, it is sufficient if the silicone glue is applied to enly one of the parts to be bonded. Which of the two parts to which it is applied is not important.

Application of the glue can be made to either of the two parts. The silicone glue is in this case, e.g. spread or applied using a dispenser technique to the parts.

Paragraph beginning on line 5 of page 4 has been amended as follows:

This means that Hence, the silicone glue must compensate, in the working temperature range, for length changes which - expressed in terms of the dimensions of the magnetic pieces - may be a few  $100 \mu m$ . If the elasticity is insufficient, stresses occur in the glue bond so as to cause strength losses and premature failure of the bond. This has been confirmed by shear-strength studies on bonds, especially after exposure to heating cycles.

Paragraph beginning on line 13 of page 4 has been amended as follows:

The production of a composite design according to the invention will be explained in more detail below.

Paragraph beginning on line 15 of page 4 has been amended as follows:

An adhesive bed of the addition-crosslinking, single-component, self-adhesive silicone glue Q 3-6611 is first produced on one of the two parts. To that end, the silicone glue is spread over the parts with a layer thickness of about 100-125 µm. Since the silicone glue is a self-adhesive silicone glue, i.e. one provided with an internal adhesive, preliminary priming of the joint surface is not necessary. After the usual degreasing of the substrate surface, e.g. using a solvent, the silicone glue can be spread directly over the part. The wetting performance can be improved further, if required, by adding fumed silica. Glass spheres having a diameter of about 100 - 125 µm are then scattered over the prepared silicone glue bed in an amount of approximately 1% by weight, expressed in terms of the total silicone glue mass. The second part is then joined onto this layer, a spaced joint with a size equal to the diameter of the glass spheres

being created. The final strength of the composite is reached by curing the silicone adhesive for about 2 hours at approximately 150°C.

On page 6, please replace "Patent Claims" with -- WHAT IS CLAIMED IS--.

### In the Claims:

1. (Amended) A composite of <u>having</u> two parts, of which one is a rare earth permanent magnet and the other is a metallic support,

the composite being formed using a thermally curable glue that forms a spaced joint, <u>comprising</u>: eharacterized in that

the <u>a</u> rare-earth permanent magnet has <u>having</u> a joint surface of at least 1000 mm<sup>2</sup>; and the <u>a</u> metallic support <u>which</u> is a ferromagnetic pole of an electrical machine, <u>wherein</u> and in that the glue <u>consists of includes</u> an addition-crosslinking, single-component and self-adhesive silicone glue,

the glue layer having a layer thickness of from about 70 to 150 µm and containing includes spherical spacers in an amount of from about 0.5 to about 5% by weight of the glue mass.

2. (Amended) The composite as claimed in claim 1, eharacterized in that wherein the diameter of the spacers, and therefore the <u>a</u> thickness of the glue layer, is between <u>about</u> 100 and <u>about</u> 125 μm.

### In the Abstract:

Please replace the Abstract in its entirety with the Abstract attached hereto.

# COMPOSITE OF TWO PARTS, FORMED USING A GLUE

### <u>Abstract</u>

A13 The invention relates to the field of machine elements for designing a composite of two parts, one of which is a rare-earth permanent magnet and the other of which is a metallic support.

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